**Vidyavardhini’s College of Engineering & Technology, Vasai (W)**

**First Year Engineering**

**(Academic Year-2024-25)**

**Applied Physics (BSC 102)**

**Course Objectives**

|  |  |
| --- | --- |
| 1 | To provide students with a basic understanding of laser operation. |
| 2 | To explain the basic working principle of optical fiber and its use in communication technology. |
| 3 | To demonstrate principles of interference in thin film. |
| 4 | To describe Maxwell’s equations and their significance. |
| 5 | To build a foundation of quantum mechanics needed for modern technology |
| 6 | To give exposure to the concept of Fermi level in semiconductors. |

**Course Outcomes**

|  |  |  |  |
| --- | --- | --- | --- |
| At the end of the course student will be able to: | | Action verb | Bloom’s Level |
| BSC102.1 | Illustrate the use of laser in LiDAR and Barcode reading. | Illustrate | Level 3 |
| BSC102.2 | Apply the foundation of fiber optics in the development of modern communication technology. | Apply | Level 3 |
| BSC102.3 | Determine the wavelength of light and refractive index of liquid using the interference phenomenon. | Determine | Level 3 |
| BSC102.4 | Illustrate the significance of Maxwell’s equations in the field of modern technology | Illustrate | Level 3 |
| BSC102.5 | Apply the foundations of quantum mechanics for the development of modern technology. | Relate | Level 3 |
| BSC102.6 | Explain the types of semiconductors based on variations in fermi level with temperature and doping concentration. | Explain | Level 3 |

**Mapping of Course Modules with Course Outcomes**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Course Modules | Course Outcomes | | | | | |
| BSC102.1 | BSC102.2 | BSC102.3 | BSC102.4 | BSC102.5 | BSC102.6 |
| Laser | 3 |  |  |  |  |  |
| Fibre Optics |  | 3 |  |  |  |  |
| Interference in thin film |  |  | 3 |  |  |  |
| Electrodynamics |  |  |  | 3 |  |  |
| Quantum Physics |  |  |  |  | 3 |  |
| Basics of Semiconductor Physics |  |  |  |  |  | 3 |

Enter correlation level 1, 2 or 3 as defined below

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation put “—“.

**Mapping of Course Outcomes with Program Outcomes and**

**Program Specific Outcomes**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| BSC102.1 | 3 | 2 | 1 | \_\_ | \_\_ | \_\_ | \_\_ | 2 | 2 | 2 | \_\_ | ­\_\_ |
| BSC102.2 | 3 | 2 | 2 | \_\_ | \_\_ | \_\_ | \_\_ | 2 | 2 | 2 | \_\_ | 2 |
| BSC102.3 | 3 | 2 | 2 | \_\_ | \_\_ | \_\_ | \_\_ | 2 | 2 | 2 | \_\_ | \_\_ |
| BSC102.4 | 3 | 2 | 1 | \_\_ | \_\_ | \_\_ | \_\_ | 1 | 1 | 1 | \_\_ | \_\_ |
| BSC102.5 | 3 | 1 | 2 | \_\_ | \_\_ | \_\_ | \_\_ | 1 | 1 | 1 | \_\_ | \_\_ |
| BSC102.6 | 3 | 2 | 1 | \_\_ | \_\_ | \_\_ | \_\_ | 1 | 1 | 1 | \_\_ | \_\_ |
| Avg. | 3 | 1.83 | 1.50 | \_\_ | \_\_ | \_\_ | \_\_ | 1.50 | 1.50 | 1.50 | \_\_ | 2.00 |
| Rounded Avg | 3 | 2 | 2 | \_\_ | \_\_ | \_\_ | \_\_ | 2 | 2 | 2 | \_\_ | 2 |

Enter correlation level 1, 2 or 3 as defined below

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation put “—“.

**CO-PO Mapping Justification**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **PO** | **Level of mapping** | **Justification** |
| BSC102.1 | PO1 | 3 | Students will be able to apply the knowledge of laser to engineering applications such as laser drilling, welding, bar code scanning, and sending signals through optical fiber cables for communication links (LAN, WAN, etc). Hence, it is significantly mapped and marked as level 3. |
| PO2 | 2 | Students will be able to analyse concepts of laser to solve complex problems in engineering such as internet speed and information processing. Hence, it is moderately mapped and marked as level 2. |
| PO3 | 2 | Students will be able to use some basics of laser to design communication links in engineering; hence, it is moderately mapped and marked as level 2. |
| PO8 | 2 | Students will be able to write assignments and solve quizzes ethically with punctuality without copying from external sources. Hence, it is moderately mapped and marked as level 2. |
| PO9 | 2 | Students will be able to understand the value of working as a team in class presentations. Hence, it is moderately mapped and marked as level 2. |
| PO10 | 2 | Students will be able to communicate effectively during question-answer sessions in the class, which reflects their oral communication ability. In addition, assignments are a reflection of written communication ability. Hence, it is moderately mapped and marked as level 2. |
| BSC102.2 | PO1 | 3 | The students will be able to apply the basic knowledge of optical fiber to engineering applications such as optical fiber communication links (LAN, WAN, etc.), Hence, it is significantly mapped and marked as level 3. |
| PO2 | 2 | Students will be able to analyze concepts of optical fiber to solve complex problems in engineering using optical fibre sensors. Hence, it is moderately mapped and marked as level 2. |
| PO3 | 2 | Students will be able to use some basics of optical fiber to design communication links in engineering; hence, it is moderately mapped and marked as level 2. |
| PO8 | 2 | Students will be able to write assignments and solve quizzes ethically with punctuality without copying from external sources. Hence, it is moderately mapped and marked as level 2. |
| PO9 | 2 | Students will be able to understand the value of working as a team in class presentations. Hence, it is moderately mapped and marked as level 2. |
| PO10 | 2 | Students will be able to communicate effectively during question-answer sessions in the class, which reflects their oral communication ability. In addition, assignments are a reflection of written communication ability. Hence, it is moderately mapped and marked as level 2. |
| PO12 | 2 | Students will be able to achieve some skills through presentations on optical fiber thereby stimulating their lifelong learning. Hence, it is moderately mapped and marked as level 2. |
| BSC102.3 | PO1 | 3 | Students will be able to apply the knowledge of interference to engineering applications such as thin film, ARC, and HRC. Hence, it is significantly mapped and marked as level 3. |
| PO2 | 2 | Students will be able to formulate and solve problems based on interference in thin film and antireflection coating. Hence, it is moderately mapped and marked as level 2. |
| PO3 | 2 | Students will be able to use some basics of interference of thin film for designing optical instruments. Hence, it is slightly mapped and marked as level 1. |
| PO8 | 2 | Students will be able to write assignments and solve quizzes ethically with punctuality without copying from external sources. Hence, it is moderately mapped and marked as level 2. |
| PO9 | 2 | Students will be able to understand the value of working as a team in class presentations. Hence, it is moderately mapped and marked as level 2. |
| PO10 | 2 | Students will be able to communicate effectively during question-answer sessions in the class, which reflects their oral communication ability. In addition, assignments are a reflection of written communication ability. Hence, it is moderately mapped and marked as level 2. |
| BSC102.4 | PO1 | 3 | The students will be able to apply the theoretical understanding of gradient, divergence, and curl for engineering applications such as designing an antenna for communications. Hence, it is significantly mapped and marked as level 3. |
| PO2 | 2 | The students will be able to formulate and solve complex engineering problems using laws of electrodynamics. Hence, it is moderately mapped and marked as level 2. |
| PO3 | 1 | Students will be able to design and develop engineering problems using Maxwell’s equations such as wave propagation in communication. Hence, it is moderately mapped and marked as level 2. |
| PO8 | 1 | Students will be able to write some assignments and solve some quizzes ethically with punctuality without copying from external sources. Hence, it is slightly mapped and marked as level 1. |
| PO9 | 1 | Students will be able to understand the value of working as a team in class presentations. Hence, it is slightly mapped and marked as level 1. |
| PO10 | 1 | Students will be able to communicate effectively during question-answer sessions in the class, which reflects their oral communication ability. In addition, assignments are a reflection of written communication ability. Hence, it is slightly mapped and marked as level 1. |
| BSC102.5 | PO1 | 3 | Students will be able to apply the theoretical understanding of quantum mechanics to various engineering applications such as STM and quantum computing; hence, it is significantly mapped and marked as level 3. |
| PO2 | 1 | Students will be able to analyze the concepts of quantum mechanics to solve some real-world problems hence it is moderately mapped and marked as level 2. |
| PO3 | 2 | Students will be able to use some fundamentals of quantum physics in various engineering designs; hence, it is slightly mapped and marked as level 1. |
| PO8 | 1 | Students will be able to write some assignments and solve quizzes ethically with punctuality without copying from external sources. Hence, it is slightly mapped and marked as level 1. |
| PO9 | 1 | Students will be able to understand the value of working as a team in some class presentations. Hence, it is slightly mapped and marked as level 1. |
| PO10 | 1 | Students will be able to communicate effectively during question-answer sessions in the class, which reflects their oral communication ability. In addition, assignments are a reflection of written communication ability. Hence, it is slightly mapped and marked as level 1. |
| BSC102.6 | PO1 | 3 | The students will be able to apply the knowledge of semiconductors in engineering applications such as solar cell, LED, etc. Hence, it is significantly mapped and marked as level 3. |
| PO2 | 2 | Students will be able to use the concepts of semiconductors to analyze different semiconductor materials for their applications; hence, it is moderately mapped and marked as level 2. |
| PO3 | 1 | Students will be able to use concepts of semiconductor to design various electronic devices such as LED, photodiode and solar cell, etc. Hence, it is moderately mapped and marked as level 2. |
| PO8 | 1 | Students will be able to write some assignments and solve quizzes ethically with punctuality without copying from external sources. Hence, it is slightly mapped and marked as level 1. |
| PO9 | 1 | Students will be able to understand the value of working as a team in various class presentations. Hence, it is slightly mapped and marked as level 1. |
| PO10 | 1 | Students will be able to communicate effectively during some question-answer sessions in the class. Hence, it is slightly mapped and marked as level 1. |